Bates Unit
5-1

Home Office: Great Bend, Kansas
P. O. Box 793 SWift 3-7903

any Beardmore Drilling Company Lease & Well No. Riner #1
ion 1308 Kelly Bushings Formation Mississippi Ticket Number 8979
Feb. 19, 1967 Sec. 36 Twp. 30s Range 2w County Sumner State Kansas
Approved by Frederick W. Stump Western Representative Norman Allen

ation Test No. 2 O.K. x Misrun Interval Tested From 3744' 3752' Total Depth 3752'
Main Hole 7 7/8 Rat Hole Conv. B.T. Damaged Yes No Conv x B.T. Damaged Yes no No
Packer Depth Ft. Size Packer Depth 3744 Ft. Size 6 3/4
lle Yes No no Conv. B.T. Damaged Yes No
Packer Depth Ft. Size

Size 5½ OD Tool Jt. Size 4½ FH Anchor Length 8 Ft. Size 5½ OD

ORDERS Depth 3746 Ft. Clock No. 6861 Depth 3749 Ft. Clock No. 6893
Top Make Kuster Cap. 3150 No. 1560 Inside Outside Bottom Make Kuster Cap. 3200 No. 1561 Inside Outside
Straddle: Depth Clock No. Inside Outside Depth Ft. Clock No. Inside Outside
Top Make Cap. No. Inside Outside Bottom Make Cap. No. Inside Outside

Set Packer 5:38 M

Open I.F.P. From 5:40 M to 5:50 M Hr. 10 Min. From (B) 28 P.S.I. To (C) 65 P.S.I.
Closed I.C.I.P. From 5:50 M. to 6:20 M. Hr. 30 Min. (D) 1150 P.S.I.
Open F.F.P. From 6:20 M. to 7:20 M. 1 Hr. Min. From (E) 89 P.S.I. To (F) 240 P.S.I.
Closed F.C.I.P. From 7:20 M. to 7:50 M. Hr. 30 Min. (G) 1136 P.S.I.
Hydrostatic Pressure (A) 1958 P.S.I. Final Hydrostatic Pressure (H) 1943 P.S.I.

ACE Size Choke 3/4 In. Max. Press. P.S.I. Time Description of Flow
RMATION M.
M.
M.

7 Fair to weak at end of test. Bottom Choke Size 3/4 In.
Well Flow Yes no No Recovery Total Ft. 330' gas cut mud; 240' heavy oil and gas cut mud; 5' free oil; 810' gas on top of fluid. Mud
sed Out Yes no No Mud Type chem. Viscosity 55 Weight 10.2 Maximum Temp. 108 °F
LA EQUIPMENT: Dual Packers no Safety Joint no Jars: Size no Make Ser. No.
Circ. Sub pin Did Tool Plug? no Where? Did Packer Hold? yes
h Drill Pipe 3159 ft. I.D. Drill Pipe 3.8 in Length Weight Pipe 540 ft. I.D. Weight Pipe 2.7 in. Length Drill Collars 30 ft.
Drill Collars 2¼ in. Length D.S.T. Tool 23 ft.
rks Slid tool 5' to bottom.

Pressure Data

Date February 19,1967 — Test Ticket No. 8979

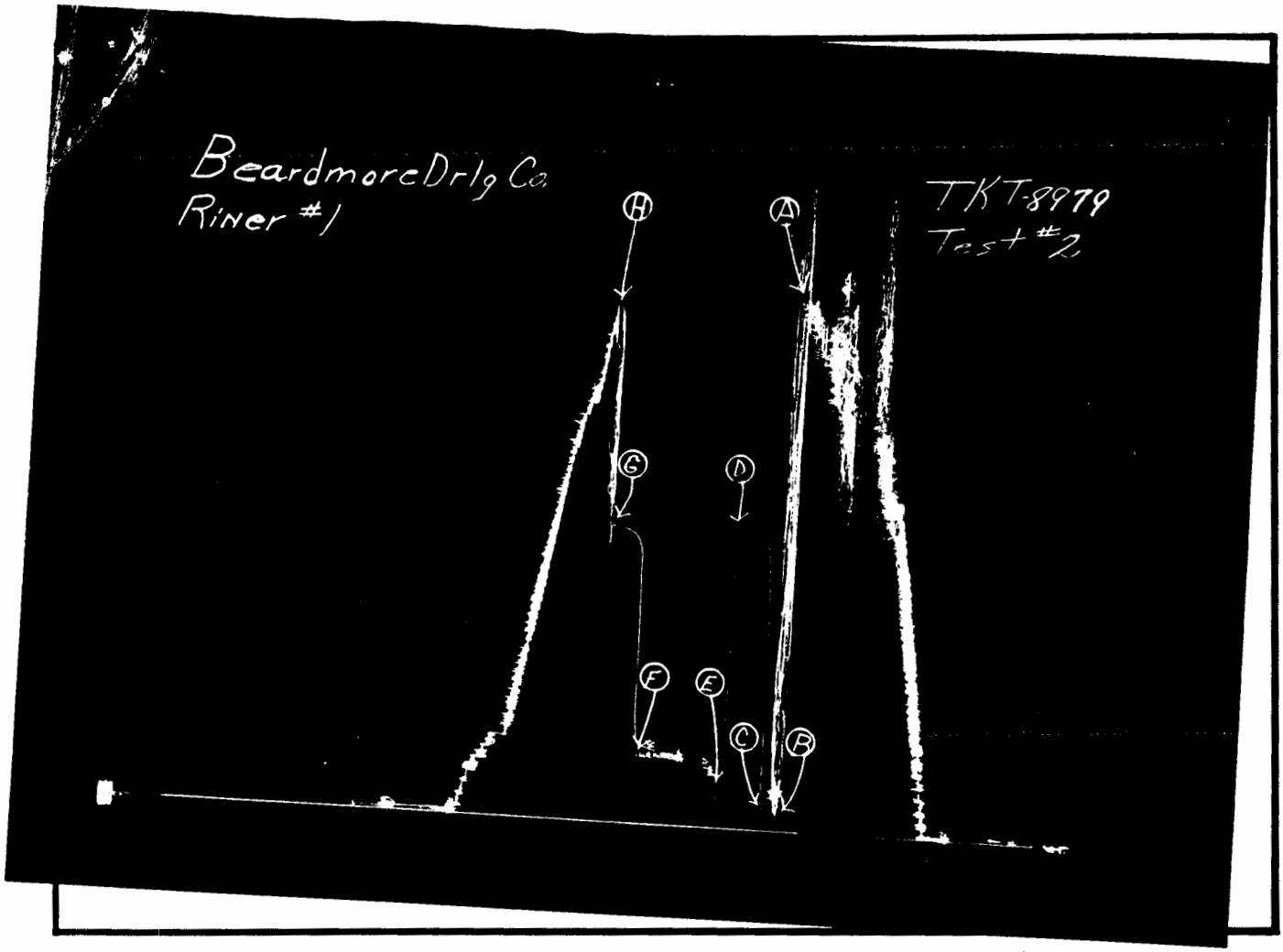
Recorder No. 1560 — Capacity 3150 — Location 3746 Ft.

Clock No. 6861 — Elevation 1308 Kelly Bushings — Well Temperature 108 °F

Point		Pressure			Time Given	Time Computed
A	Initial Hydrostatic Mud	1958	P.S.I.	Opened Tool	5:38 P	
B	First Initial Flow Pressure	28	P.S.I.	First Flow Pressure	10 Mins.	10 Mins.
C	First Final Flow Pressure	65	P.S.I.	Initial Closed-in Pressure	30 Mins.	29 Mins.
D	Initial Closed-in Pressure	1150	P.S.I.	Second Flow Pressure	60 Mins.	60 Mins.
E	Second Initial Flow Pressure	89	P.S.I.	Final Closed-in Pressure	30 Mins.	29 Mins.
F	Second Final Flow Pressure	240	P.S.I.			
G	Final Closed-in Pressure	1136	P.S.I.			
H	Final Hydrostatic Mud	1943	P.S.I.			

PRESSURE BREAKDOWN

First Flow Press.		Initial Shut-In		Second Flow Pressure		Final Shut-In	
Breakdown: 2 Inc.		Breakdown: 9 Inc.		Breakdown: 12 Inc.		Breakdown: 9 Inc.	
of 5 mins. and a		of 3 mins. and a		of 5 mins. and a		of 3 mins. and a	
final inc. of — Min.		final inc. of 2 Min.		final inc. of — Min.		final inc. of 2 Min.	
Point Mins.	Press.	Point Minutes	Press.	Point Minutes	Press.	Point Minutes	Press.
P 1 0	28	0	65	0	89	0	240
P 2 5	44	3	1061	5	128	3	360
P 3 10	65	6	1115	10	199	6	1061
P 4		9	1131	15	206	9	1099
P 5		12	1139	20	214	12	1113
P 6		15	1142	25	225	15	1122
P 7		18	1145	30	228	18	1127
P 8		21	1147	35	232	21	1131
P 9		24	1148	40	236	24	1134
P10		27	1149	45	241	27	1135
P11		89	1150	50	241	29	1136
P12				55	240		
P13				60	240		
P14							
P15							
P16							
P17							
P18							
P19							
P20							



This is an actual photograph of recorder chart.

POINT		PRESSURE
(A)	Initial Hydrostatic Mud	1958 PSI
(B)	First Initial Flow Pressure	28 PSI
(C)	First Final Flow Pressure	65 PSI
(D)	Initial Closed-in Pressure	1150 PSI
(E)	Second Initial Flow Pressure	89 PSI
(F)	Second Final Flow Pressure	240 PSI
(G)	Final Closed-in Pressure	1136 PSI
(H)	Final Hydrostatic Mud	1943 PSI

COMPANY LEASE AND WELL NO. SEC. TWP. RGE. TEST NO. DATE

	1st Min.	2nd Min.				
Flow Time	15	60	Date	2-19-67	Ticket Number	449465 S
Closed In Press. Time	30	30	Kind of Job	OPEN HOLE	Halliburton District	WINFIELD
Pressure Readings	Field	Office Corrected	Tester	J.D. DURHAM	Witness	FRED STUMP
Depth Top Gauge	3727 Ft.	no Blanked Off	Drilling Contractor	SHAWVER & ARMOUR		LC
BT. P.R.D. No.	684	12 Hour Clock	Elevation	1308' KB	Top Packer	-
Initial Hydro Mud Pressure	-	2011	Total Depth	3743'	Bottom Packer	3731'
Initial Closed in Pres.	1133	1125	Interval Tested	Net pay 12' 3731' - 3743'	Formation Tested	Mississippi
Initial Flow Pres.	18 1	15	Casing or Hole Size	7 7/8"	Casing Perfs. Top	
	44 2	69			Bot.	
Final Flow Pres.	53 1	51	Surface Choke	½"	Bottom Choke	3/4"
	105 2	105				
Final Closed in Pres.	1115	1117	Size & Kind Drill Pipe	4 ½" FH	Drill Collars Above Tester I.D. - LENGTH	2 ¼" - 198'
Final Hydro Mud Pressure	-	1967	Mud Weight	10.2	Mud Viscosity	40
Depth Cen. Gauge	Ft.	Blanked Off	Temperature °F Est. / °F Actual	calc. 100	Anchor Size & Length ID / OD	3 ½" X 4½" 12'
BT. P.R.D. No.		Hour Clock	Depths Mea. From	Kelly Bushing	Depth of Tester Valve	3723 Ft.
Initial Hydro Mud Pres.			Cushion TYPE / AMOUNT	none Ft.	Depth Back Pres. Valve	DCIP VALVE 3719 Ft.
Initial Closed in Pres.			Recovered	200 Feet of	heavy oil & gas cut mud	
Initial Flow Pres.	1		Recovered	40 Feet of	muddy water	
	2					
Final Flow Pres.	1		Recovered	Feet of		
	2					
Final Closed in Pres.			Recovered	Feet of		
Final Hydro Mud Pres.			Oil A.P.I. Gravity	-	Water Spec. Gravity	Duncan, Oklahoma -
Depth Bot. Gauge	3739 Ft.	yes Blanked Off	Gas Gravity	-	Surface Pressure	- psi
BT. P.R.D. No.	528	12 Hour Clock	Tool Opened A.M. P.M.	2:50 A.M.	Tool Closed A.M. P.M.	4:35 A.M.
Initial Hydro Mud Pres.	-	2015	Remarks	Opened tool for a 15 minute first flow with		
Initial Closed in Pres.	-	1123		strong blow. Closed tool for a 30 minute initial		
Initial Flow Pres.	- 1	22		closed in pressure. Reopened tool for a 60 minute		
	- 2	72				
Final Flow Pres.	- 1	52		final flow with strong blow. Gas to surface in 55		
	- 2	106				
Final Closed in Pres.	-	1117		minutes -- too weak to measure. Closed tool for a		
Final Hydro Mud Pres.	-	1972		30 minute final closed in pressure.		

RECEIVED
MAY 11
FEB 28 1967
Halliburton Company
Duncan, Oklahoma

Legal Location Sec. - Twp. - Rng. C SW SE 31 30S 1 W
Lic. No. Name LC
Well No. 1
Test No. 1
Field Area BATES POOL
County SUMNER
State KANSAS
Lease Owner/Company Name BEARDMORE DRILLING COMPANY
Owner's District

RINER Bates 5-1 Miss

FORMATION TEST DATA

SPECIAL PRESSURE DATA

Gauge No. 684	Depth 3727'	Clock 12 hour	Ticket No. 449465

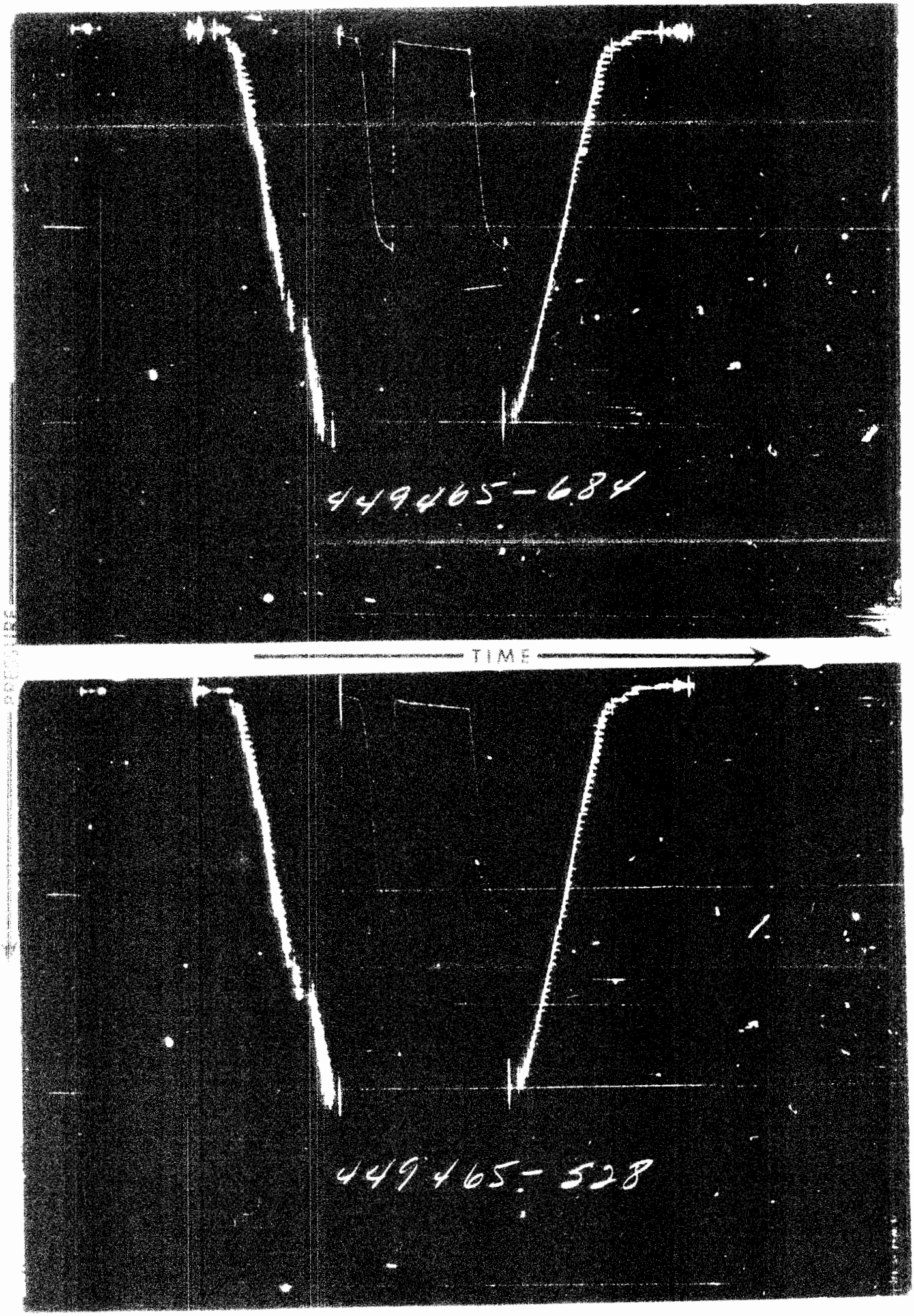
	First Flow Period		Initial Closed In Pressure			Second Flow Period		Final Closed In Pressure		
	Time Defl. .000"	PSIG Temp. Corr.	Time Defl. .000"	Log $\frac{t+\theta}{\theta}$	PSIG Temp. Corr.	Time Defl. .000"	PSIG Temp. Corr.	Time Defl. .000"	Log $\frac{t+\theta}{\theta}$	PSIG Temp. Corr.
P_0	.000	15	.000		51	.000	69	.000		105
P_1	.0204	29	.0221		114	.1085	75	.0214		318
P_2	.0408	36	.0442		272	.2170	84	.0428		504
P_3	.0612	42	.0663		490	.3255	96	.0642		701
P_4	.0816	47	.0884		734	.4340	105	.0856		876
P_5	.1020	51	.1105		918			.1070		989
P_6			.1326		1026			.1284		1046
P_7			.1547		1075			.1498		1078
P_8			.1768		1099			.1712		1098
P_9			.1989		1111			.1926		1109
P_{10}			.2210		1125			.2140		1117

Gauge No. 528	Depth 3739'	Clock 12 hour

P_0	.000	22	.000		52	.000	72	.000		106
P_1	.0206	29	.0218		101	.1065	76	.0218		289
P_2	.0412	36	.0436		241	.2130	84	.0436		489
P_3	.0618	42	.0654		454	.3195	95	.0654		701
P_4	.0824	47	.0872		702	.4260	106	.0872		875
P_5	.1030	52	.1090		902			.1090		984
P_6			.1308		1014			.1308		1044
P_7			.1526		1068			.1526		1078
P_8			.1744		1098			.1744		1097
P_9			.1962		1109			.1962		1109
P_{10}			.2180		1123			.2180		1117
Reading Interval	3		3			15		3		Minutes

REMARKS:

SPECIAL PRESSURE DATA


449465-684
PRESSURE
TIME
449465-528

	1st Min.	2nd Min.
Flow Time	20	60
Closed In Press. Time	30	30
Pressure Readings	Field	Office Corrected
Depth Top Gauge	4147 Ft.	NO Blanked Off
BT. P.R.D. No.	684	12 Hour Clock
Initial Hydro Mud Pressure	-	2134
Initial Closed in Pres.	1564	1567
Initial Flow Pres.	35 1	29
	35 2	47
Final Flow Pres.	44 1	41
	53 2	76
Final Closed in Pres.	1458	1443
Final Hydro Mud Pressure	-	2105
Depth Cen. Gauge	Ft.	Blanked Off
BT. P.R.D. No.		Hour Clock
Initial Hydro Mud Pres.		
Initial Closed in Pres.		
Initial Flow Pres.	1	
	2	
Final Flow Pres.	1	
	2	
Final Closed in Pres.		
Final Hydro Mud Pres.		
Depth Bot. Gauge	4153 Ft.	YES Blanked Off
BT. P.R.D. No.	528	12 Hour Clock
Initial Hydro Mud Pres.	-	2142
Initial Closed in Pres.	-	1571
Initial Flow Pres.	- 1	37
	- 2	57
Final Flow Pres.	- 1	47
	- 2	82
Final Closed in Pres.	-	1449
Final Hydro Mud Pres.	-	2113

Date	2-25-67	Ticket Number	449469 - S
Kind of Job	OPEN HOLE	Halliburton District	WINFIELD
Tester	MR. DURHAM	Witness	MR. STUMP
Drilling Contractor	SHAWVER & ARMOUR		IC
Elevation	1308' K.B.	Top Packer	-
Total Depth	4156'	Bottom Packer	4150'
Interval Tested	6' NET PAY 4150'-4156'	Formation Tested	SIMPSON
Casing or Hole Size	7 7/8"	Casing Perfs. Top / Bot.	-
Surface Choke	1/4"	Bottom Choke	3/4"
Size & Kind Drill Pipe	4 1/2" F.H.	Drill Collars Above Tester (I.D. - LENGTH)	2 1/4" x112'
Mud Weight	9.6	Mud Viscosity	38
Temperature	110 °F Est. / °F Actual	Anchor Size & Length ID / OD	3 1/2" x 4 1/2" 6'
Depths Mea. From	KELLY BUSHINGS	Depth of Tester Valve	4143' Ft.
Cushion TYPE / AMOUNT	- Ft.	Depth Back Pres. Valve	DUAL CIP VALVE 4139' Ft.
Recovered	92 Feet of	Drilling mud with trace of oil	
Recovered	60 Feet of	Watery mud with trace of oil	
Recovered	Feet of		
Recovered	Feet of		
Oil A.P.I. Gravity	-	Water Spec. Gravity	-
Gas Gravity	-	Surface Pressure	- psi
Tool Opened	8:00 PM A.M. P.M.	Tool Closed	9:50 PM A.M. P.M.

MAILED
FEB 28, 1967
Halliburton Company
Duncan, Oklahoma

Remarks: Opened tool for 20 minute 1st flow with a weak blow. Closed tool for 30 minute initial closed in pressure. Reopened tool for 60 minute 2nd flow with a weak blow throughout test. Closed tool for 30 minute final closed in pressure.

Legal Location Sec. - Twp. - Rng.: SEC. 31 - 30S - 1W C/SW/SE
Lease Name: BATES Unit S-1
Well No.: 1
Test No.: 3
Field Area: BATES POOL
County: SUMNER
State: KANSAS
Lease Owner/Company Name: HALLIBURTON COMPANY
Owner's District: KANSAS

FORMATION TEST DATA

5

SPECIAL PRESSURE DATA

Gauge No. 684	Depth 4147'	Clock 12 hour	Ticket No. 449469

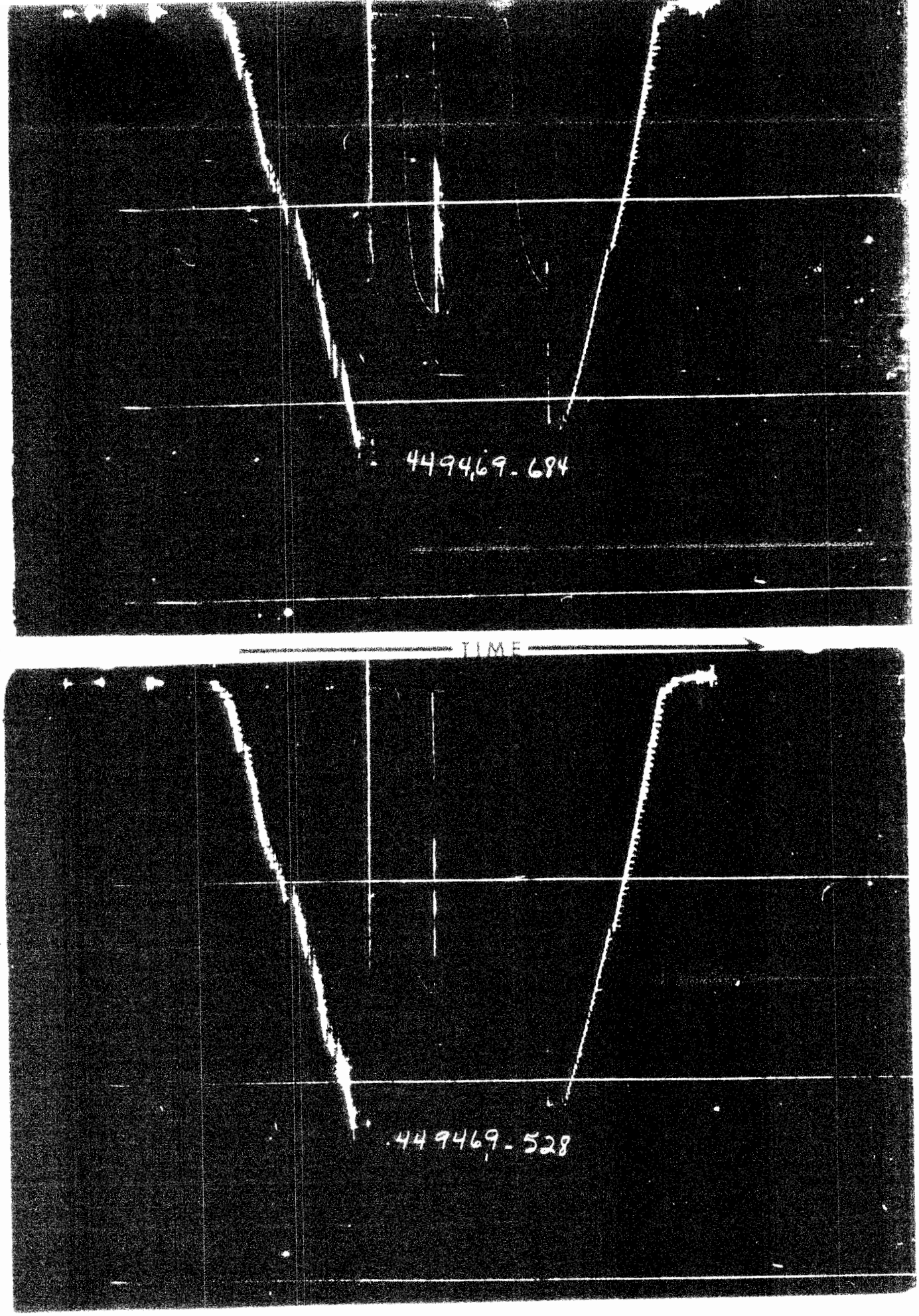
First Flow Period		Initial Closed In Pressure			Second Flow Period		Final Closed In Pressure		
Time Defl. .000"	PSIG Temp. Corr.	Time Defl. .000"	Log $\frac{t+\theta}{\theta}$	PSIG Temp. Corr.	Time Defl. .000"	PSIG Temp. Corr.	Time Defl. .000"	Log $\frac{t+\theta}{\theta}$	PSIG Temp. Corr.
.000	29	.000		41	.000	47	.000		76
.041	32	.0199		92	.1053	57	.0208		194
.082	36	.0398		1009	.2105	64	.0416		913
.123	39	.0597		1212	.3158	70	.0624		1120
.164	41	.0796		1370	.4210	76	.0832		1228
		.0995		1433			.1040		1289
		.1194		1475			.1248		1335
		.1393		1508			.1456		1372
		.1592		1531			.1664		1397
		.1791		1551			.1872		1422
		.1990		1567			.2080		1443

Gauge No. 528	Depth 4153'	Clock 12 hour	

.000	37	.000		47	.000	57	.000		82
.0405	39	.0208		107	.1065	64	.0217		206
.0810	43	.0416		1026	.2130	72	.0434		937
.1215	44	.0624		1230	.3195	77	.0651		1125
.1620	47	.0832		1362	.4260	82	.0868		1234
		.1040		1431			.1085		1296
		.1248		1477			.1302		1340
		.1456		1510			.1519		1377
		.1664		1534			.1736		1403
		.1872		1554			.1953		1427
		.2080		1571			.2170		1449
Reading Interval 5		3			15		3		Minutes

REMARKS:

SPECIAL PRESSURE DATA


4494,69-684
TIME
449469-528

Flow Time	1st Min. 20	2nd Min. 60	Date	2-26-67	Ticket Number	449470 - S	
Closed In Press. Time	1st Min. 30	2nd Min. 30	Kind of Job	OPEN HOLE	Halliburton District	WINFIELD	
Pressure Readings	Field	Office Corrected	Tester	MR. DURHAM	Witness	MR. STUMP	
Depth Top Gauge	4168 Ft.	Blanked Off NO	Drilling Contractor	SHAWVER & ARMOUR		IC	
BT. P.R.D. No.	684	Hour Clock 12	Elevation	1308' K.B.	Top Packer	-	
Initial Hydro Mud Pressure	-	2156	Total Depth	4178'	Bottom Packer	4172'	
Initial Closed in Pres.	‡511	1490	Interval Tested	NET PAY 6' 4172'-4178'	Formation Tested	SIMPSON	
Initial Flow Pres.	9 1	10	Casing or Hole Size	7 7/8"	Casing Perfs. Top		
	18 2	18			Bot.	-	
Final Flow Pres.	18 1	16	Surface Choke	1/4"	Bottom Choke	3/4"	
	35 2	39				I.D. - LENGTH	
Final Closed in Pres.	1458	1438	Size & Kind Drill Pipe	4 1/2" F.H.	Drill Collars Above Tester	2 1/4" x 112'	
Final Hydro Mud Pressure	-	2153	Mud Weight	9.8	Mud Viscosity	45	
Depth Cen. Gauge	Ft.	Blanked Off	Temperature	110 °F Est. / °F Actual	Anchor Size & Length ID / OD	3 1/2" X 4 1/2" 6'	
BT. P.R.D. No.		Hour Clock	Depths Mea. From	KELLY BUSHINGS	Depth of Tester Valve	DUAL CIP VALVE 4160' Ft.	
Initial Hydro Mud Pres.				TYPE AMOUNT	Depth Back Pres. Valve	4164' Ft.	
			Cushion	- Ft.			
Initial Closed in Pres.			Recovered	70 Feet of Drilling mud			
Initial Flow Pres.	1		Recovered	Feet of			
	2						
Final Flow Pres.	1		Recovered	Feet of			
	2						
Final Closed in Pres.			Recovered	Feet of			
Final Hydro Mud Pres.			Oil A.P.I. Gravity	-	Water Spec. Gravity	-	
Depth Bot. Gauge	4174 Ft.	Blanked Off YES	Gas Gravity	-	Surface Pressure	- psi	
BT. P.R.D. No.	528	Hour Clock 12	Tool Opened	A.M. P.M. 5:20 PM	Tool Closed	A.M. P.M. 7:10 PM	
Initial Hydro Mud Pres.	-	2162	Remarks	Opened tool for 20 minute 1st flow with a very weak blow. Closed tool for 30 minute initial closed in pressure. Reopened tool for 60 minute 2nd flow with no blow throughout test. Closed tool for 30 minute final closed in pressure.			
Initial Closed in Pres.	-	1495					
Initial Flow Pres.	- 1	16					
	- 2	24					
Final Flow Pres.	- 1	22					
	- 2	47					
Final Closed in Pres.	-	1445					
Final Hydro Mud Pres.	-	2162					

MAILED
MAR 1 1967
Halliburton Company
Duncan, Oklahoma

Mea. From Tester Valve

Legal Location Sec. - Twp. - Rng.: SEC. 31 - 30S - 1W
Lease Name: BEARDMORE DRILLING COMPANY
Well No.: 1
Test No.: 4
Field Area: BATES POOL
County: SUMNER
State: KANSAS
Lease Owner/Company Name
Owner's District

BEARDMORE Bates S-1

FORMATION TEST DATA

5

SPECIAL PRESSURE DATA

Gauge No. 684	Depth 4168'	Clock 12 hour	Ticket No. 449470

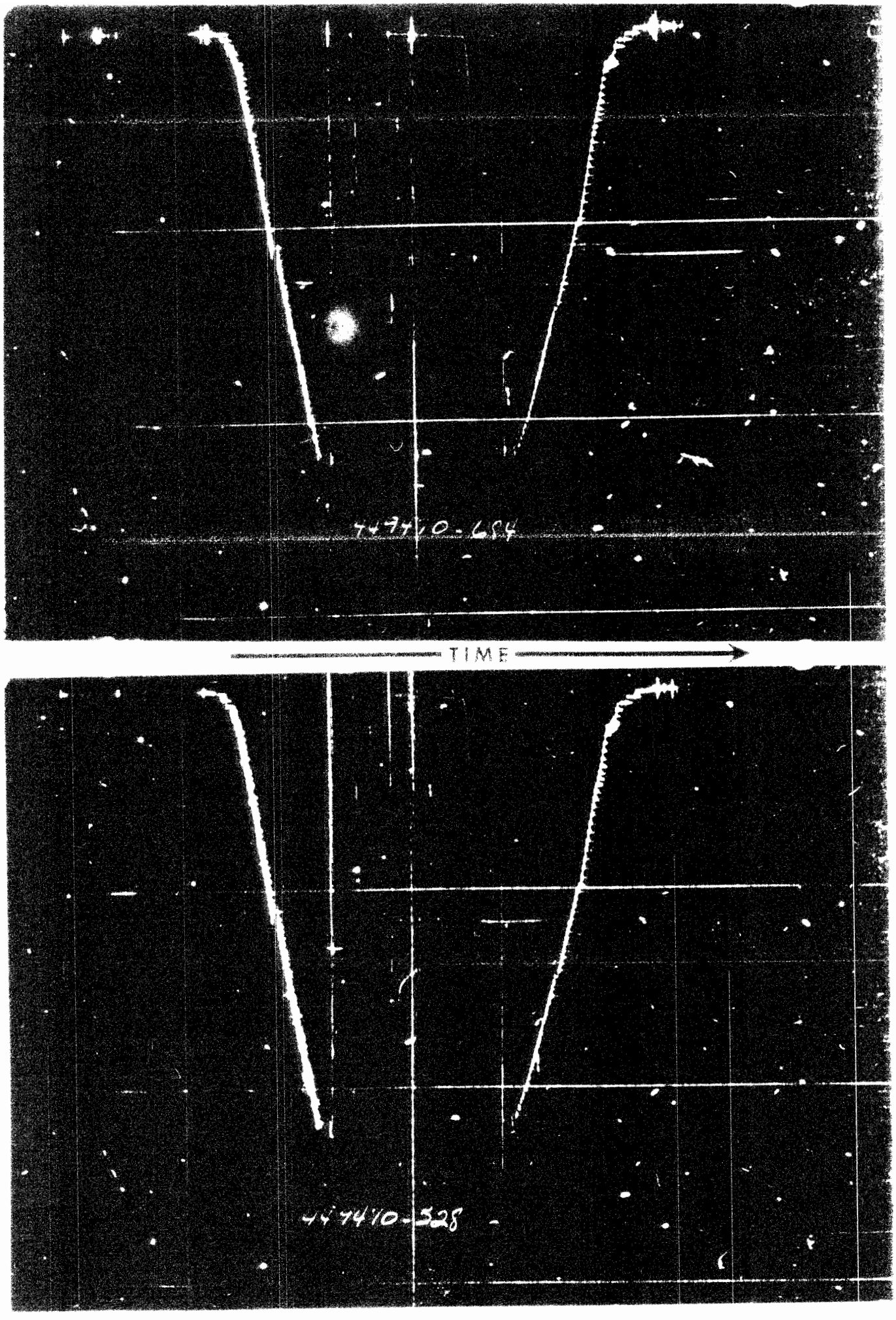
	First Flow Period		Initial Closed In Pressure			Second Flow Period		Final Closed In Pressure		
	Time Defl. .000"	PSIG Temp. Corr.	Time Defl. .000"	Log $\frac{t+\bullet}{\bullet}$	PSIG Temp. Corr.	Time Defl. .000"	PSIG Temp. Corr.	Time Defl. .000"	Log $\frac{t+\bullet}{\bullet}$	PSIG Temp. Corr.
P_0	.000	10	.000		16	.000	18	.000		39
P_1	.035	11	.0211		912	.108	21	.0209		121
P_2	.070	14	.0422		1342	.216	30	.0418		968
P_3	.105	15	.0633		1406	.324	33	.0627		1275
P_4	.140	16	.0844		1435	.432	39	.0836		1342
P_5			.1055		1453			.1045		1373
P_6			.1266		1466			.1254		1394
P_7			.1477		1474			.1463		1409
P_8			.1688		1482			.1672		1420
P_9			.1899		1487			.1881		1430
P_{10}			.2110		1490			.2090		1438

Gauge No. 528	Depth 4174'	Clock 12 hour

P_0	.000	16	.000		22	.000	24	.000		47
P_1	.0355	17	.0213		792	.107	27	.0215		155
P_2	.0710	20	.0426		1328	.214	38	.0430		1012
P_3	.1065	21	.0639		1402	.321	42	.0645		1281
P_4	.1420	22	.0852		1436	.428	47	.0860		1345
P_5			.1065		1456			.1075		1379
P_6			.1278		1469			.1290		1402
P_7			.1491		1478			.1505		1417
P_8			.1704		1485			.1720		1427
P_9			.1917		1491			.1935		1436
P_{10}			.2130		1495			.2150		1445
Reading Interval	5		3			15		3		Minutes

REMARKS:

SPECIAL PRESSURE DATA



Each Horizontal Line Equals 1000 psi

Phillips 5-1 Bates Unit
Sec. 36-30s-2W

3731-43'
Mississippi

HALLIBURTON SERVICES

LIQUID RESERVOIR DATA WORK SHEET

Required Data:

Oil - API Gravity @ 60° F.	42	°
Gradient @ 60° F.		PSI/ft.
Water - Specific Gravity ° 60° F.		-
Gradient ° 60° F.		PSI/ft.
Oil or Water Est. Viscosity (Res.)	use 1.8	cp
Net Pay (h)	6	ft.
Temperature	109°	° F.
Drill Pipe Capacity		bbls./ft.
Drill Collar Capacity		bbls./ft.
Hole or Casing Size		in.

Type of Build-up Plot = M (Ref. Instr. #2)

Pressure Static (Ps) - Pressure 1 cycle (P_{10}) = M PSI/cycle

1250 - 540/970 = 710/280 PSI/cycle

Production Rate - (Ref. Instr. #3)

Production Rate - by Fill-up Pressure Change (Not Flowing)

(P_2 - P_1) ÷ psi/ft. x bbls./ft. x min. da. ÷ time = Q bbls./da

( ) ÷ x x 1440 ÷ = 36.5 bbls./da

Production Rate - (Flowing) (Ref. Instr. #4)

bbls./rec. x min. da. ÷ flow time = bbls./da.

x ÷ = bbls./da.

(over)

Transmissibility = $\left(\frac{Kh}{\mu}\right)$ (Ref. Instr. #5)

162.6 x Production (Q) ÷ M = $\left(\frac{Kh}{\mu}\right)$ $\frac{\text{Md. ft.}}{\text{cp}}$

162.6 x 36.5 ÷ 710/280 = 8.36/21.20 $\frac{\text{Md. ft.}}{\text{cp}}$

Indicated Flow Capacity = (Kh) (Ref. Instr. #6)

$\left(\frac{Kh}{\mu}\right)$ x μ = (Kh) Md. ft.

8.36/21.2 x 1.8 = 15.05/38.16 Md. ft.

Average Effective Permeability = K (Ref. Instr. #7)

Kh ÷ h = K Md

15.05/38.16 ÷ 6 = 2.51/6.36 Md

Damage Ratio = DR (Ref. Instr. #8)

0.183 x (Ps - Pf) ÷ M = DR

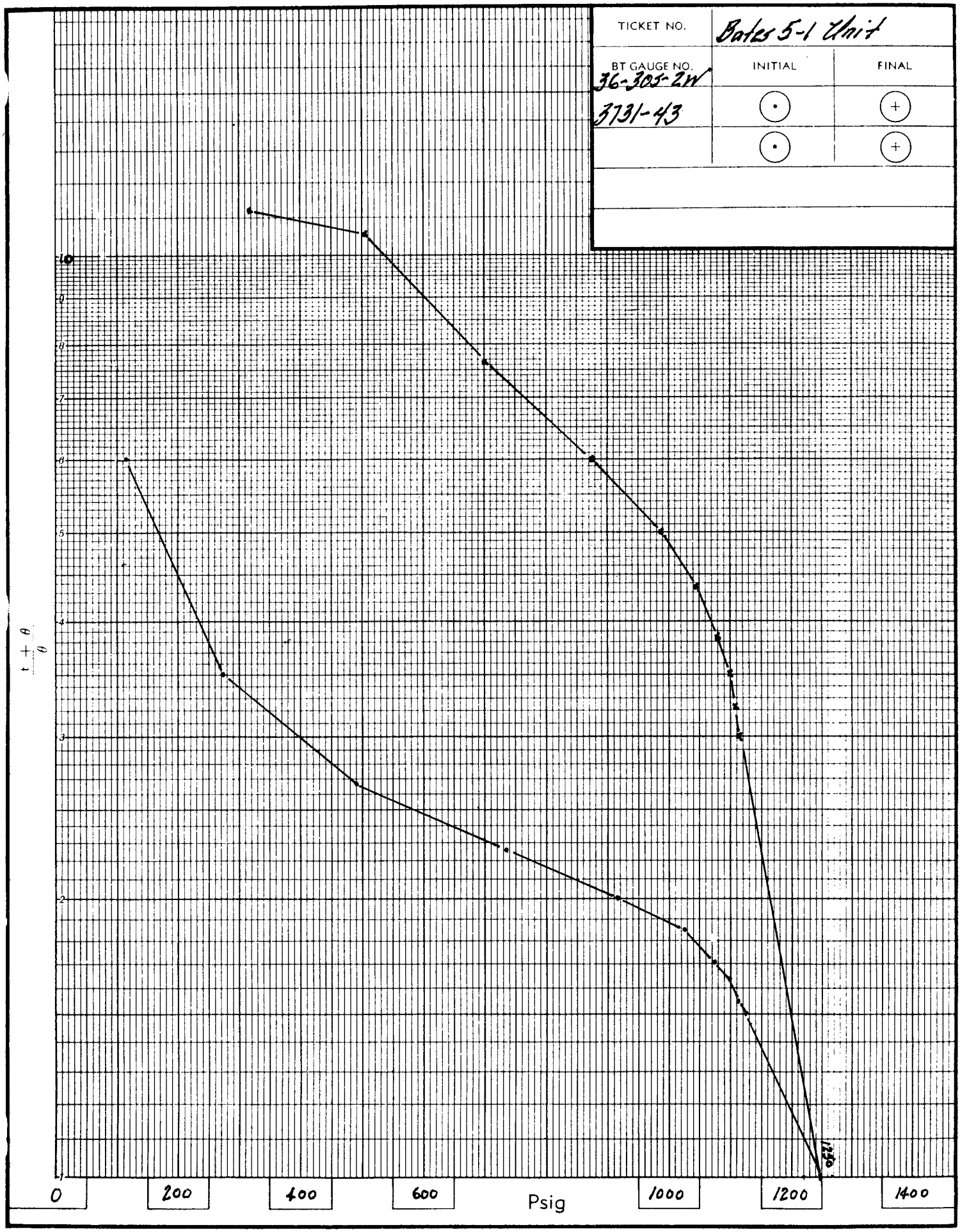
0.183 x (1250 - 106) ÷ 710/280 = 0.29/0.75 No damage

Theoretical Potential with Damage Removed (Ref. Instr. #9)

Q x DR = Q_1 bbls./da.

36.5 x _____ = _____ bbls./da.

TICKET NO.	Bates 5-1 Unit	
BT GAUGE NO.	INITIAL	FINAL
36-305-2W		
3731-43	⊙	+
	⊙	+



EXTRAPOLATED PRESSURE GRAPH

Phillips 5-1 Bates Unit
Sec. 36-30S-2W

3744-52'
Mississippi

HALLIBURTON SERVICES

LIQUID RESERVOIR DATA WORK SHEET

Required Data:

Oil - API Gravity @ 60° F.	42	°
Gradient @ 60° F.		PSI/ft.
Water - Specific Gravity ° 60° F.		-
Gradient ° 60° F.		PSI/ft.
Oil or Water Est. Viscosity (Res.)	2.3	cp
Net Pay (h)	8	ft.
Temperature	109	° F.
Drill Pipe Capacity		bbls./ft.
Drill Collar Capacity		bbls./ft.
Hole or Casing Size		in.

Type of Build-up Plot = M (Ref. Instr. #2)

Pressure Static (Ps) - Pressure 1 cycle (P_{10}) = M PSI/cycle

1160 - 1090 / 1110 = 70 / 50 PSI/cycle

Production Rate - (Ref. Instr. #3)

Production Rate - by Fill-up Pressure Change (Not Flowing)

(P_2 - P_1) ÷ psi/ft. x bbls./ft. x min. da. ÷ time = Q bbls./da

( ) ÷ x x 1440 ÷ = 94.6 bbls./da

Production Rate - (Flowing) (Ref. Instr. #4)

bbls./rec. x min. da. ÷ flow time = bbls./da.

x ÷ = bbls./da.

(over)

Transmissibility = $\left(\frac{Kh}{\mu}\right)$ (Ref. Instr. #5)

162.6 x Production (Q) ÷ M = $\left(\frac{Kh}{\mu}\right)$ Md. ft. / cp

162.6 x 94.6 ÷ 70/50 = 219.74/307.64 Md. ft. / cp

Indicated Flow Capacity = (Kh) (Ref. Instr. #6)

$\left(\frac{Kh}{\mu}\right)$ x μ = (Kh) Md. ft.

219.74/307.64 x 2.3 = 505.4/707.57 Md. ft.

Average Effective Permeability = K (Ref. Instr. #7)

Kh ÷ h = K Md

505.4/707.57 ÷ 8 = 63.18/88.45 Md

Damage Ratio = DR (Ref. Instr. #8)

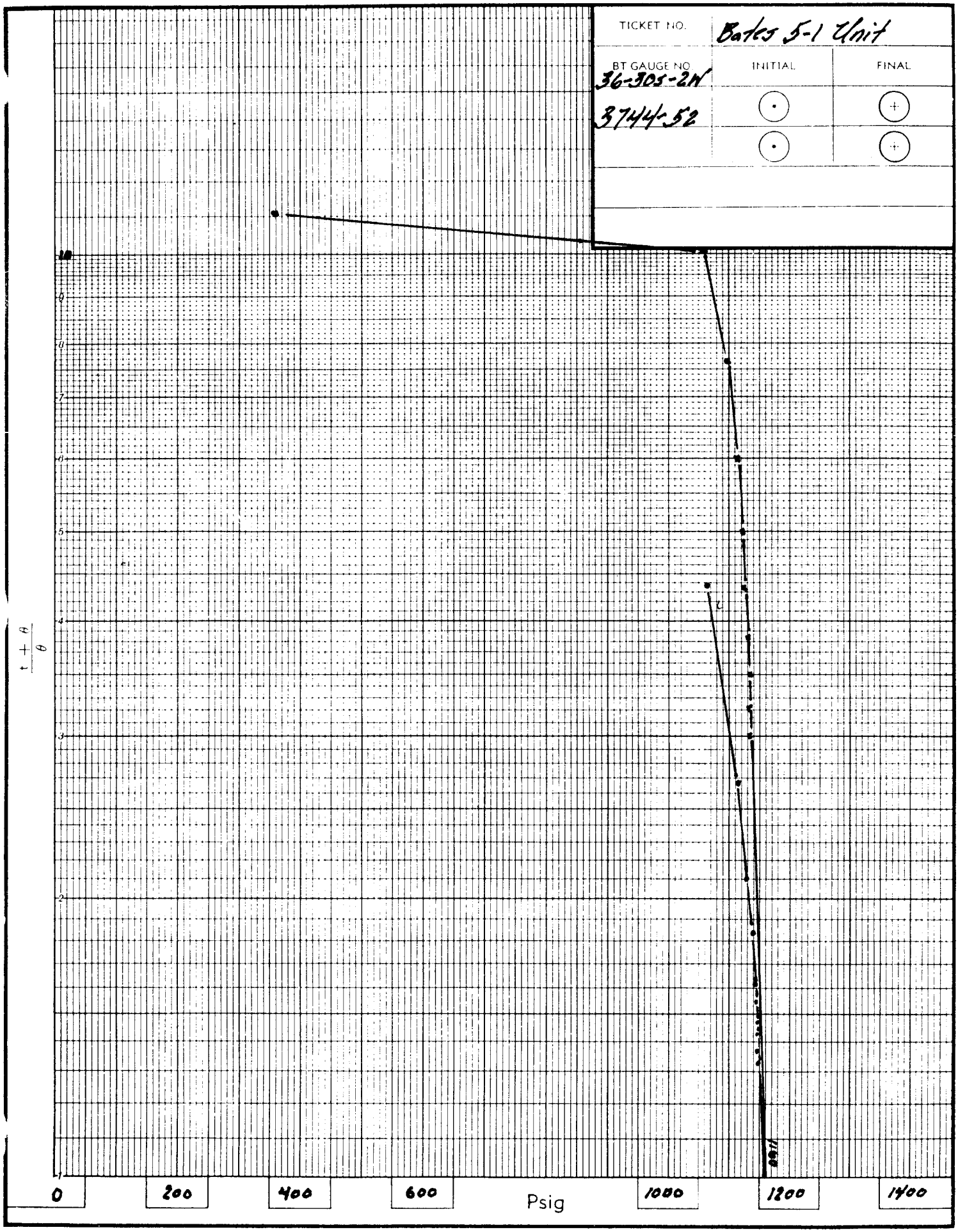
0.183 x (Ps - Pf) ÷ M = DR

0.183 x (1160 - 240) ÷ 70/50 = 2.41/3.37 Significant Damage

Theoretical Potential with Damage Removed (Ref. Instr. #9)

Q x DR = Q_1 bbls./da.

94.6 x _____ = _____ bbls./da.



EXTRAPOLATED PRESSURE GRAPH